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JOINT COMMUNICATIONS DOCTRINE AT THE OPERATIONAL LEVEL

by

Carl M. Tegen

Major, United States Army

A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

Signature: Carl M Tegen

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CHAPTER I

INTRODUCTION

The Department of Defense needs to improve the joint communications doctrine at the operational level of war. The current doctrine accommodates pre-existing Service doctrine, rather than define how joint communications should be handled in order to ensure effective Command and Control (C^2) during the exercise of the operational art. This paper will examine joint communications doctrine as it applies to the operational level of war, identify weaknesses, and recommend improvements.

The Goldwater-Nichols Defense Reorganization Act of 1986 dramatically changed the way the United States military does business. The Act strengthened the role of the Unified Commander-in-Chief (CINC), and codified the command relationships from the National Command Authority (NCA) down to the CINC. The leadership of all four Services have embraced the spirit of the Act, and it is widely recognized that jointness is here to stay. Interservice communications failures during the 1983 invasion of Grenada were at least partially responsible for the Congressional mandate to improve joint capabilities. Ironically, the recently published joint communications doctrine, which is some of the first post-Goldwater-Nichols joint doctrine to be finalized, has not changed appreciably.

The emerging doctrine for joint operations is spelled out in the Joint Publications, published by the Joint Chiefs of Staff (JCS). The doctrine focuses on the concept of operational art. In a recent white paper, the Chairman reaffirmed the focus:

> The overarching operational concept in Joint Pub 1 is that the Joint Force Commander synchronize the action of air, land, sea, space, and special operations forces to achieve strategic and operational objectives through integrated joint campaigns and major operations.[1]

In order to synchronize and integrate something as complex as a joint military operation, an effective Command, Control, and Communications (C^3) structure is absolutely essential. This paper will focus specifically on the communications aspect of Command, Control, and Communications.

Although joint communications doctrine has been published faster than the other joint doctrine, it suffers from deficiencies. Some of the deficiencies have manifested themselves in the communications support for Operation Desert Storm, and Operation Provide Comfort. After identifying some of the key deficiencies, this paper will examine the root causes, and recommend some solutions.

The operational level of war cannot be precisely tied to a level of command within the Services. However, it is most often associated with a Joint Task Force (JTF) or a Unified Command. The joint doctrine relates the operational art to the "Joint Force Commander".[2] To be consistent, this paper will look at communications from the Joint Force Commander perspective.

CHAPTER II

HISTORY OF JOINT COMMUNICATIONS DOCTRINE

The size and complexity of the battlefield have mushroomed in this century, and the commander's reliance on increasingly sophisticated communications has grown proportionally. Communications foul-ups can spell failure for a military operation, no matter how well the rest of the operation is planned and executed. Communications problems have hindered several military operations over the past twenty years, starting with the 1980 Iran hostage rescue mission.[3] However, the most conspicuous example occurred during the 1983 invasion of Grenada.

GRENADA

The widely criticized communications failure during Operation Urgent Fury, the liberation of Grenada, sharply illustrates the significance of communications. The Army troops could not talk to the Marines only a few miles away because they were operating on different frequencies. The JTF was hobbled by its inability to synchronize its combat power. Naval gunfire could not be used to support combat troops because the lack of communications prevented effective fire direction. Naval aviation support was similarly limited. The mission was ultimately accomplished, but there has been much debate ever since about whether the victory could have been won at a lower cost. Senator Sam Nunn, in reviewing the operation, lamented: "It is sobering to look at how much went wrong and at how many

failures of coordination and communication there were".[4] The Congressional concern for the military's inability to effectively carry out joint operations led to the Goldwater-Nichols Act. The Act has broken down many of the impediments to joint thinking, and joint doctrine has matured rapidly since 1986. However, a review of the communications role in Desert Storm will show that joint communications doctrine still has a long way to go.

DESERT STORM

Desert Storm required the installation of the most extensive tactical communications network in history. In terms of size, complexity, quality, and reliability, the network far exceeded everything before it. The communications network performed its mission exceedingly well, and the now famous "Hail Mary" maneuver by VII Corps could not have been accomplished without it. However, careful analysis reveals some serious problems which need to be addressed.

The massive communications network was installed incrementally over a period of six months. The deployment of communications assets into Southwest Asia (SWA) was phased, and balanced against the need to move critical warfighting assets. The inability to provide adequate communications early in the Desert Shield build-up prevented the CINC from deploying to the AOR, as the CJCS urged him to do for political reasons.[5] The Air Tasking Order (ATO), a massive document drafted by the Joint Forces Air Component Commander (JFACC) could not be transmitted electronically to the Navy because the Air Force and Navy used

different "black boxes". Each night, a paper copy was dispatched by helicopter courier to the Naval Component Commander embarked in the Persian Gulf.

The Joint Communications Control Center (JCCC) was not prepared to manage such a complex and colossal network. The network management cell was largely an adhoc collection of engineers drawn from units all over the world. The JCCC found it difficult to enforce network discipline. Subordinate network managers, not accustomed to higher authority (at the operational level), had competing priorities. Problems which might have been solved in minutes, from a technical point of view, often took days to resolve. The six months of time it took to install the network might have been unacceptable had the Iraqis attacked into Saudi Arabia early in the fall. The network was never challenged to be reconfigured in response to a catastrophic event, such as an enemy attack.

Desert Storm saw an over-reliance on satellite transmission systems because of the vast distances, lack of life support, speed, and relative ease of installation. This caused rationing of satellite space. The inability to support some users impacted operational decisions about where and when to locate combat support units.[6] Users frequently had to go position their headquarters close to the communications node, rather than have the communications come to them.

Each of the communications "problems" identified in Desert Storm, could have been eliminated by some technical or procedural

modification. Many were dealt with through field expedient fixes. However, a temporary solution does not always correct the underlying problem. It is worth considering whether these problems are endemic to shortfalls in the joint communications doctrine which governs how the military communicates. Perhaps the Department of Defense (DoD) should reconsider how it looks at communications doctrine.

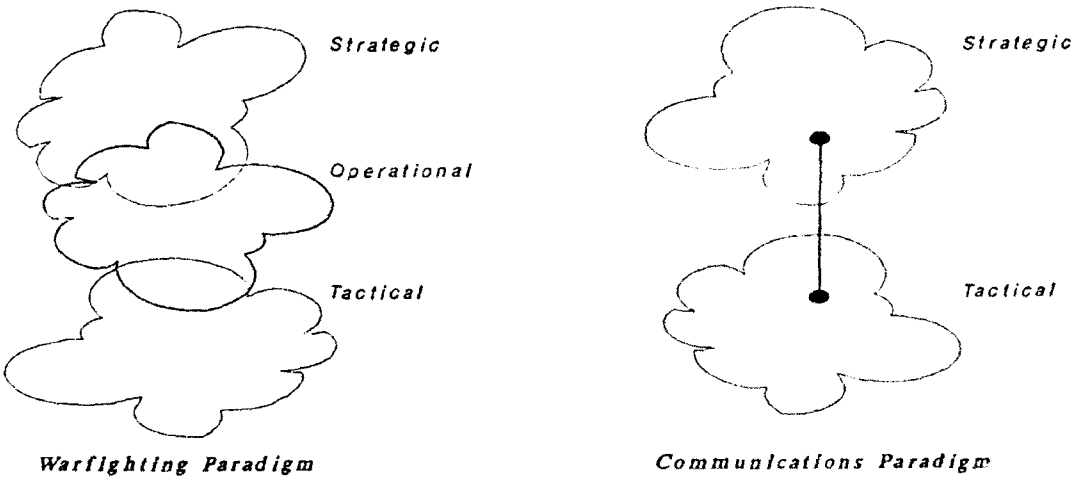
CHAPTER. III

CURRENT DOCTRINE

THE STRATEGIC/TACTICAL BOUNDARY

Military communications systems have generally been categorized as either *strategic* or *tactical*, and this remains the case in Joint Pub 6-0, *Doctrine For Command, Control, Communications and Computers (C^4) Systems Support to Joint Operations*.[7] The strategic portion of the architecture is referred to as *sustaining base*, *fixed station*, or more commonly, the *Defense Communications System (DCS)*. All other communications assets are considered as *tactical* communications. The terminology is important, because the two categories of communications (strategic and tactical) do not correspond directly with the three levels of war (strategic, *operational*, and tactical), used elsewhere in the joint doctrine (Figure 1).

FIGURE 1



Levels of War vs. Levels of Communications

Communications assets at the strategic level are planned, developed and supported by the Defense Information Systems Agency (DISA), formerly the Defense Communications Agency (DCA). While the JCS promulgates doctrine, DISA is responsible to ensure interoperability of the Worldwide Military Command and Control System (WWMCCS), the DCS, theater and tactical C^2 systems, NATO and/or allied C^4 systems, and commercial systems.[8]

The DCS provides the peacetime connectivity from the NCA down to the CINCs and to all of the various DoD organizations that might support a JTF. The network is permanently installed and provides access at thousands of locations throughout the world. In peacetime it provides nearly all of the communications required for a CINC headquarters, as well as the links down to and among the subordinate units. When a CINC or JTF headquarters deploys, it must receive a level of communications support exceeding its peacetime support in terms of volume, security, and responsiveness.

The doctrine envisions an "extension of the DCS" by the combatant commander with tactical assets provided by the components.[9] There is a conspicuous boundary between the DCS world and the "tactical" world in the communications doctrine, and consequently in the actual communications networks that are used to support field operations. During Operation Provide Comfort, the Kurdish humanitarian relief operation in northern Iraq, there was an inability to reliably process precedence calls from the tactical network, through the gateway, into the DCS

network. The Combined Task Force Commander personally had his phone calls blocked on several occasions. The problem was rectified over a period of several days by a technical correction, but the original problem highlights the difficulties in "extending the DCS" as well as the difficulties in linking dissimilar communications networks together on a time-sensitive basis.

SECURITY

Security schemes sharply differentiate the tactical network from the DCS, and this contributes to the breakdown between the two networks. End-to-end encryption between DCS subscribers is achieved through the use of secure telephones units (STU III) with electronic key inserted at each terminal. In the tactical network the key for each telephone is generated at the switchboard, and transmitted over the air. The tactical telephones cannot interoperate with DCS versions in a secure mode. Limited numbers of DCS-type phones can be scattered among tactical subscribers, but the ability to smoothly communicate in a secure mode between networks is severely constrained.

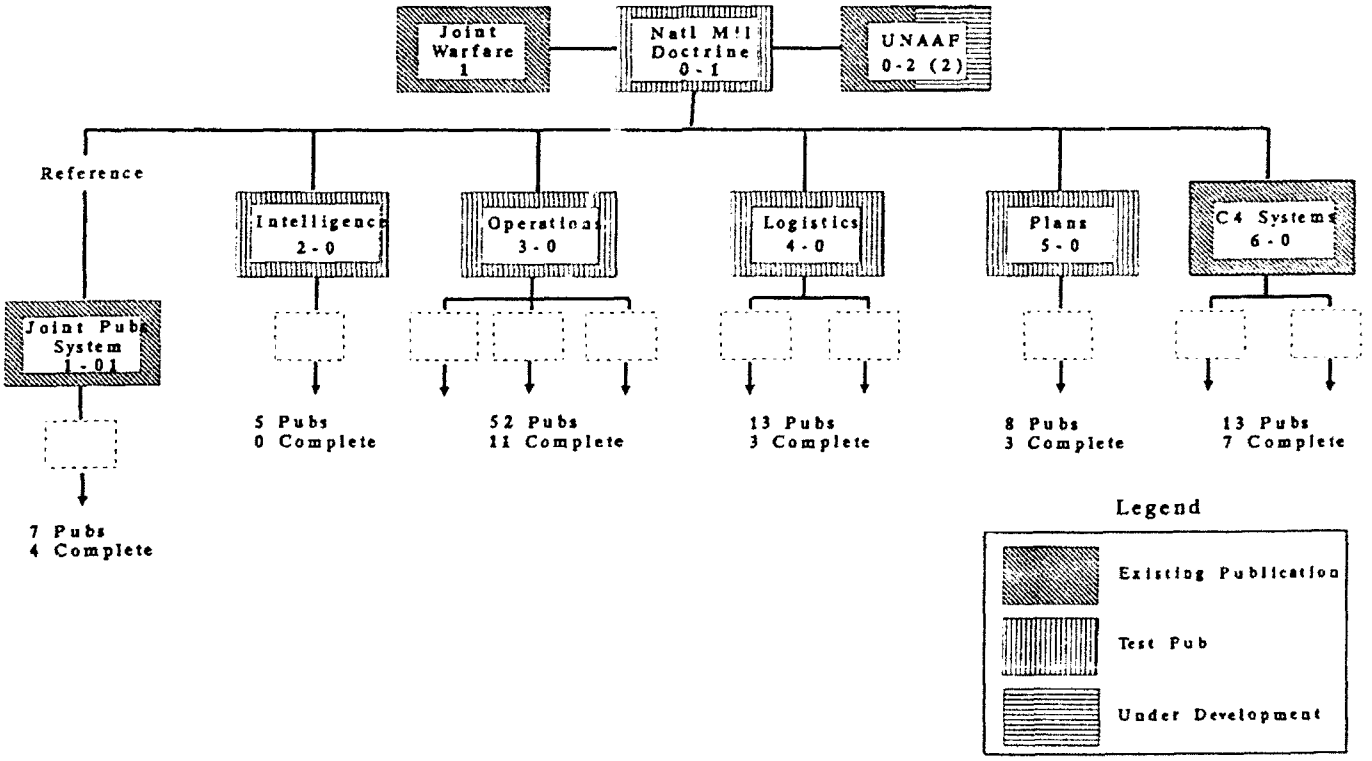
Many of the DoD tactical communications systems in existence today were developed as components of autonomous Service networks. The making of communications doctrine and the thus the specification of operational requirements has been largely focused on the successful prosecution of tactics. This Service-specific systems acquisition process is consistent with the budgetary process, where each of the Services justifies and

fights for its research and development and procurement budgets independently. The Defense Reorganization Act of 1986 gave the CINCs more input to the process, but the communications systems fielded today were started before 1986. Therefore the doctrine of today is essentially an attempt to tie all of these systems together, after the fact.

CURRENT DOCTRINE

Not all joint doctrine has been published. In fact, the only capstone document that has been released in final format is the communications publication, Joint Pub 6-0 (Figure 2).[10]

FIGURE 2



Status of Joint Publications

As of: August 92

Since 1986, joint operations have been conducted with "Test Pubs", which are essentially drafts. This is the case with the **intelligence**, **operations**, **logistics** and **plans** capstone documents. The communications pubs are "ahead" in terms of publishing final versions, but *fast* does not equate to *good*.

Joint Pub 6-0 was published in 1992, *after* Desert Storm. However, the final publication is not substantially different than the Test Pub that was in force during Desert Storm. Joint Pub 6-0 states that the "fundamental objective" of a C^4 system is:

> ...to get the critical and relevant information to the right place in time to allow forces to seize the opportunity and meet the objectives of the operational continuum.[11]

Joint Pub 6-0 specifies the Basic Doctrine in terms of an imperative:

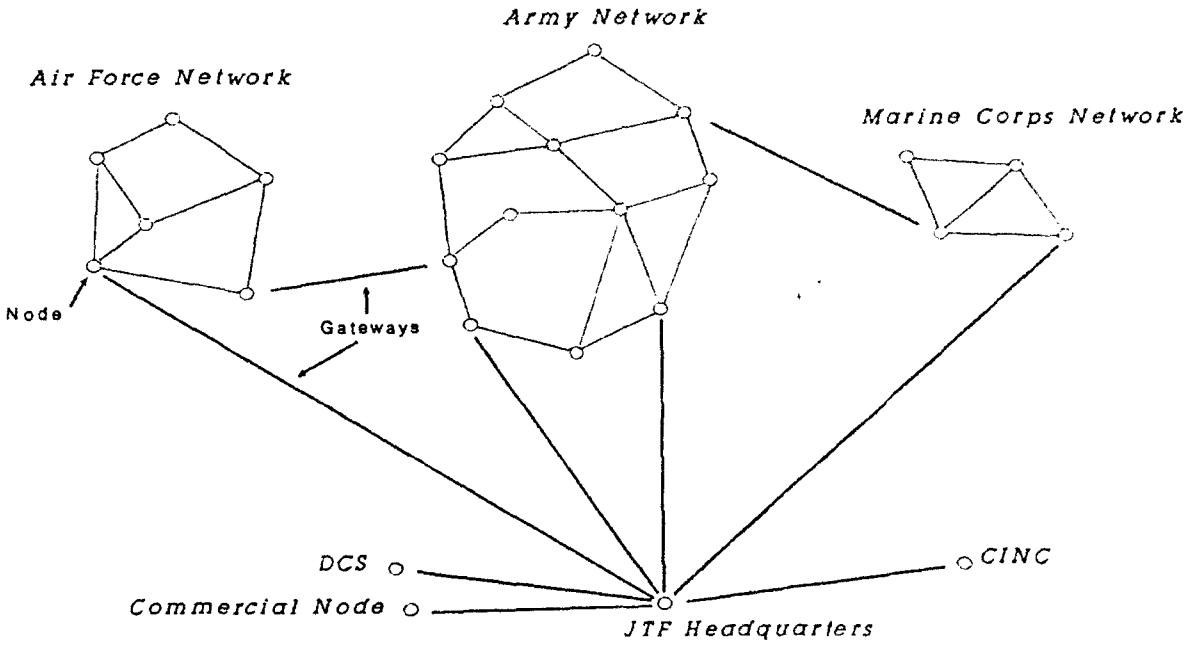
> An unbroken chain of communications must extend from the National Command Authorities (NCA), through the Chairman of the Joint Chiefs of Staff, to the combatant commanders, commanders of Service components, and all subordinate commanders.[12]

There is no issue here, since a break anywhere in the chain will jeopardize the entire operation. The problem is that the doctrine lacks teeth to ensure the "unbroken chain".

The joint doctrine specifies a "generic C^4 joint system that links the supported CINC to the JTF, the JSOTF (Joint Special Operations Task Force), the deployed service components, and DCS".[13] The effect of the current doctrine is to cause the JTF commander to deploy a communications architecture which is a

"network of networks" (Figure 3). ·Each sub-network contains two or more switchboards, which are depicted in Figure 3 as "nodes".

FIGURE 3



JTF "Network of Networks"

The number of nodes varies by the size of the operation. The Army had over sixty nodes in the Army portion of Desert Storm network. The nodes are connected by multichannel transmission links, normally over some type of multiplexed radio path. The links between sub-networks are known as "gateways".

The Army, Navy, Air Force, and Marine Corps communications systems differ significantly, and sometimes dramatically. Each service has a network management cell which engineers and controls its network. The J6 at the CINC or JTF level operates a

Joint Communications Control Center (JCCC), which must integrate the service networks into a cohesive, efficient theater network which supports the operational commander's C^2 function.

The doctrine assigns the responsibility for deciding how to employ communications systems between units and commands to the JTF commander. The generic guidance states that "communications and C^4 systems can be employed as follows: senior to subordinate, supporting to supported, reinforcing to reinforced, left to right, between adjacent units as directed."[14] This guidance had little meaning in Riyadh and Daharan, Saudi Arabia during Desert Storm, or in Zakhu, Iraq during Provide Comfort. Army, Air Force, Marine Corps, other joint headquarters, and coalition partners tend to locate their headquarters wherever they can get real estate. There is no "left to right" in a bowl of spaghetti. The communications will almost always be installed with the first available assets -- regardless of the source.

The doctrine gives little guidance about integrating the communications networks of the Services. The JTF commander has *the authority* to tailor communications assets however he chooses. However, the specifics about how to do this are limited. Joint Pub 6-05.1 states:

> When two or more component commanders are collocated within a geographical area, their C^4 requirements are to be coordinated and consolidated to the maximum extent possible. The responsible joint HQ J-6 is informed of any cross-Service agreements.[15]

From a practical point of view, this relegates the JTF commander to the role of referee. Allowing any type of decentralized

decisionmaking in a network runs the risk of *suboptimization*. For instance, the Air Force network managers will tend to make decisions that are favorable to the Air Force, regardless of the impact to the Army.

JCSE

The Joint Communications Support Element (JCSE), a highly trained, jointly staffed, battalion sized communications unit "may be available" to the JTF commander.[16] JCSE is controlled by the CJCS, and is included in the sample JTF Organization of Joint Pub 5-00.2, the *Joint Task Force Planning Guidance and Procedures*.[17] JCSE is a hybrid unit which is well suited to interface with the various service communications systems. However, it is a one-of-a-kind unit with very limited resources. JCSE can support a total of two JTF HQs, and two Joint Special Operations Task Force (JSOTF) Hqs if it is made available by the CJCS. If it is not released, the JTF must provide all communications support from service component assets. JCSE can quickly establish satellite links back to the NCA, and it provides excellent C^2 communications for the actual JTF headquarters. The installation of a network from the JTF headquarters down to the various subordinate headquarters must be accomplished with some combination of Service-provided assets.

TRI-TAC

The Tri-Service Tactical Communications System (TRI-TAC), developed and fielded over the past twenty years, was specifically designed to ensure interoperability at the

operational level. The system includes digital switchboards, transmission equipment, telephones, facsimiles and message terminals. TRI-TAC equipment was built to specifications requiring technical interoperability with most tactical and DCS systems in existence today. However, the TRI-TAC systems presently fielded include differing versions which require additional engineering effort to incorporate into a network.

The AN/TTC-39 switchboard, the heart of the network, exists in three fundamentally different forms. The Army has recently converted most (but not all) of its switchboards to a flood search routing scheme in order to be compatible with the Mobile Subscriber Equipment (MSE) network used at the Corps level and below. The Air Force retained its switchboards in a deterministic routing format. Determi istic routing requires detailed system engineering, where the route of a telephone call through the switched network is pre-determined. Flood search routing allows the computerized switchboard to "search" for the most efficient route for each call. The switchboards will "talk" to each other through a gateway. However, a "seam" exists between the Army and the Air Force networks, similar to the boundary between the DCS and the "tactical" network. The practical effect of this seam is that Army and Air Force staffs, who must communicate heavily together, have different dialing procedures and phone numbering schemes. The phone books are different. Although electrical connectivity exists, the telephone user may not know how to call counterparts throughout

the network. The network isn't "user friendly". In a network with several thousand subscribers, this results in confusion and degradation of efficiency in terms of information flow.

The Marine Corps has a third version of switchboard with similar technical differences and the associated limitations on interoperability. The Navy does not possess any large "tactical" switchboards. JCSE has another version of switchboard, and the Special Operations Forces (SOF) deploy with yet another.

Several modes of transmission media are used to interconnect the various types of switchboards in this network of networks. Satellite, tropospheric scatter, cable, and line of site (LOS) radios using Very High Frequency (VHF), Ultra High Frequency (UHF) and Super High Frequency (SHF) bands are used. Each service possesses a different combination of transmission equipment in whatever quantities and variations the respective service has determined it requires. All of the variety contributes to the complexity of the network management function.

NETWORK MANAGEMENT AND LOGISTICAL DIFFERENCES

The technical differences between equipment are compounded by procedural differences for network management and logistical support. The services have developed network management procedures for their new equipment independently. Resolving disagreements, particularly between gateways, is more difficult when the technicians at the two ends of a problem approach the troubleshooting process differently.

The Army and Marine Corps push supply and maintenance

support forward. The Air Force maintains most spare parts at its sustaining base (which may be in CONUS), and calls forward critically needed parts when required. The JTF commander, who owns all of the assets in the Area of Responsibility (AOR), he may have to take spare parts from the Army stockage in order to repair a critical Air Force system. The differing maintenance concepts between Services result from a lack of common communications doctrine.

USER OWNED AND OPERATED

The Army has nearly completed implementation of a "user owned and operated" policy regarding terminal equipment. Communications units provide wire line access to the network and subscribers provide their own telephones, computer terminals, and faxes. Communications personnel still supply and install these items of equipment in the other Services. The diagram at Figure 3 depicted Service networks physically separated. In reality, they are likely to overlap geographically in many locations. During Desert Storm, there were Army, Air Force, commercial, DCS, and JCSE switchboards in close proximity supporting thousands of customers from all four Services, and from several coalition partners. Joint headquarters are normally staffed with personnel from each Service. Implementation of the Army user owned and operated policy poses obvious difficulties. Network managers must decide how subscribers requiring support from an Army switchboard will get terminal instruments, and then coordinate to make it happen. Army signal units do not carry

sufficient telephones, nor cable installation personnel to supply a major headquarters with the required telephone service.

The equipment which is currently fielded does interoperate in a purely technical sense. However, the equipment can also be operated in modes which hinder interoperability *between networks*. The process of integrating several smaller networks into a network of networks is management intensive and inherently slow.

CHAPTER IV

CONCLUSIONS AND RECOMMENDATIONS

In each of the Services there is an understandable trend toward increasingly sophisticated weapon systems. The power of the microprocessor, if properly directed, can serve as a force multiplier for the CINC by dramatically improving speed, accuracy, and reliability. The fields of intelligence, logistics, air defense, fire control, aviation, and many others, stand to benefit from the computer's ability to store and rapidly process massive amounts of data. Operational art seeks to fuse all of the fields of military science together into a cohesive, joint force. A prerequisite to this fusion in the computer age is the ability to share data in real time; to communicate.

The communications world must stay ahead of the breakneck pace of the jointness trend. As joint doctrine continues to develop, it will increasingly rely on the communications network to move massive data around a complex battlefield efficiently. Communications represent the glue which holds joint operations together. If the communications fail, so will the joint operation. This is axiomatic.

The operational art is offensively oriented. The purpose is to synchronize and integrate all of the elements of combat power. The operational commander must understand the role of communications from a defensive perspective as well. Clearly, communications represent an achilles heal in the joint force.

The absolute reliance on data means that a failure in the communications system that feeds the weapon system will yield a catastrophic failure. The prudent commander must realize that computers are susceptible to viruses, electromagnetic pulse (emp), heat, vibration, moisture, and sabotage. The doctrine which describes how we fight must take account of the fact that any one of these considerations can mean the difference between victory and defeat.

Today's joint communications doctrine for the operational level of war falls short in several key areas. The doctrine does little more than stitch together several dissimilar networks into a theater network. This puts the JTF commander in the position of *adapting* his network to the actions of his subordinate commanders. To turn this relationship around it will be necessary to build a joint communications doctrine which directs specifically *how* the entire theater network will be installed.

In order to draft a more useful communications doctrine, it will be necessary to accurately forecast the communications requirements of all players on the battlefield. The forecast must take account of throughput, quality, and unique Service requirements. The communications networks must then be engineered *centrally* to optimize the overall network capability, and to preclude the possibility of suboptimization. The end result may require procedural changes, or force structure changes, or both. Clearly force structure should react to, rather than dictate doctrine.

The communications doctrine for the Services must then be made *to conform to the joint doctrine*, rather than visa versa. The warfighters should not be unduly constrained by communications. The ability to *task organize* communications assets is essential. The fact that the services will operate in geographically overlapping regions is inescapable. Therefore the JTF commander must demand flexibility to interchange assets freely among his component commanders. *Interoperability* is not good enough. The goal should be *interchangability*.[18] This freedom should not be constrained by equipment incompatibilities, network management or logistical differences.

The doctrine must address the lack of specificity concerning the *operational level* of war. In order to "integrate the available capabilities and synchronize their application to achieve the assigned objective", the operational commander must have a communications system which is specifically designed to contribute to *integration* and *synchronization*.[19] In this way, U.S. technological capabilities in the communications arena will contribute to the successful prosecution of the operational art.

NOTES

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2. Ibid., p. 3.

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3. John P. Gelinne, "An Assessment of the Impact of the Goldwater-Nichols Department of Defense Reorganization Act of 1986 on Joint Command, Control, and Communications (C^3)," Naval Postgraduate School, March 1989, p. 24.

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8. Ibid., p. IV-3.

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12. Ibid., p. I-3.

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14. Joint Pub 6-0, p. I-4.

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16. Joint Pub 5-00.2, p. IV-3.

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